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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,334	06/28/2007	Yasuyuki Goto	P09042US00/RFH	7073

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STITES & HARBISON PLLC
401 COMMERCE STREET
SUITE 800
NASHVILLE, TN 37219

EXAMINER	
BOHATY, ANDREW K	
ART UNIT	PAPER NUMBER
1786	

NOTIFICATION DATE	DELIVERY MODE
08/05/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

richard.myers@stites.com
francine.vanaelst@stites.com

Office Action Summary	Application No.	Applicant(s)	
	10/599,334	GOTO ET AL.	
	Examiner	Art Unit	
	Andrew K. Bohaty	1786	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 July 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) *7-19* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 October 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *2007/06/28; 2010/02/17*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claims 7-19 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected group, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on July 1, 2010.

2. Applicant's election with traverse of Group I, claims 1-6, in the reply filed on July 1, 2010 is acknowledged. The traversal is on the ground(s) that the claims do not lack unity of invention. This is not found persuasive because Groups I-IV lack unity of invention *a priori* because the groups do not have a special technical feature that is common through all the claims and the applicant's did not point out a special technical feature in there response.

3. Furthermore, it was shown that Groups I and II lack unity of invention to the special technical feature of a light emitting element comprising a hole transporting layer insoluble in alcohols and an electron transporting layer containing a phosphorous-containing organic compound that is soluble in alcohols because it does not make contribution over the prior art of Tamano et al. (US 5,811,834) (hereafter "Tamano") in view Doi et al. (WO 03/046108), where Tanaka et al. (US 2005/0106413) (hereafter "Tanaka") is used as the English equivalent. This combination shows that the applicant's special technical feature is known in the art; therefore, the Office takes the position there is lack of unity of invention even though the International stage did not find a lack of unity of invention. Also, the applicant's disclosure was only used to show

that PEDOT:PSS is inherently insoluble in alcohols and since is a property of PEDOT:PSS all PEDOT:PSS even it not state before are in soluble in alcohols; therefore, the use of the applicant's disclosure was not improper.

4. It was also shown that Groups III and IV lack unit of invention to the special technical feature of a phosphine oxide organic compound because it does not make a contribution over the prior art Hnoosh et al. (Canadian Journal of Chemistry, 1969, 47, 4679-4685).

5. The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

8. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tamano et al. (US 5,811,834) (hereafter "Tamano") in view Doi et al. (WO 03/046108),

where Tanaka et al. (US 2005/0106413) (hereafter "Tanaka") is used as the English equivalent.

9. Regarding claims 1-4, Tamano teaches a light emitting device composed only of a hole injection layer and a light emitting layer disposed between the anode and the cathode; therefore, the light emitting layer is acting as the electron transporting layer as well (column 23 lines 39-55). Tamano teaches the light emitting layer can be composed of an phosphorus containing organic compound (compounds (35) and (36) column 23 lines 29-38). Compounds (35) and (36) are both nonionic and have molecular weights of 1401.53 g/mol and 1465.53 g/mol respectively. Compound (35) reads on applicant's formula (1), where Ar^1 is a substituted aromatic ring residue (substituted phenyl group) and Ar^2 and Ar^3 and unsubstituted aromatic ring residues (phenyl groups). Tamano teaches that the light emitting layer can be made using a wet method and the solvent can be ethanol (column 25 lines 11-26). Tamano teaches that the hole injection layer can compose of electrically conductive polymers (column 49-67).

10. Tamano does not specifically teach an electrically conductive polymer that can be used in the hole injection layer that is insoluble in alcohols.

11. Tanaka (Doi et al) teaches a light emitting device comprising an anode, a hole injection layer, a light emitting layer/electron transporting layer, and a cathode (paragraph [0178]). Tanaka teaches the hole injection layer is composed of PEDOT:PSS (paragraph [0178]). Tanaka teaches the PEDOT:PSS decreases the drive voltage and improves the hole injection efficiency of the electroluminescent device.

12. It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute electrically conductive polymer of Tamano for PEDOT:PSS as taught by Tanaka. The substitution would have been one known conductive polymer that can be used in the hole injection layer for another conductive polymer and would lead to the predictable results of using PEDOT:PSS as a hole injection material in a light emitting device. The motivation would have been to use a hole injection material that decreases the drive voltage and improves the hole injection efficiency of the device.

13. Although Tanaka is silent on the solubility of PEDOT:PSS, PEDOT:PSS is a compound taught by the applicant that is not soluble in alcohols; therefore, PEDOT:PSS is inherently insoluble in alcohols.

14. The combination would lead to a device with an anode, a hole injection layer composed of PEDOT:PSS, which is insoluble in alcohols, a light emitting/electron transporting layer composed of a phosphorus containing compound, which is soluble in ethanol and can be deposited by a wet method, and a cathode as claimed.

15. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murase et al. (JP2004-095221) (hereafter "Murase"), where a machine translation is used as an English language document.

16. Regarding claims 1-4, Murase teaches an electroluminescent device comprising an anode and a cathode and a hole transporting layer and an electron transporting layer found between the two electrodes (paragraphs [0005]). Murase teaches the hole

transporting layer can be composed of NPD, which the applicant teaches as a hole transporting material that is not soluble in alcohols (paragraph [0015]). Murase teaches the electron transporting material can be a non-ionic phosphine compound and the phosphine compound can have the following formula, formula (1), where Ar^1, R^1, and R^3 can be aryl groups, such as benzene, biphenyl, naphthyl, and phenanthrene (paragraphs [0028]-[0038] and [0043]), which meets applicant's formula (1). Murase teaches the electron transporting layer can be made by using spin coating a wet method (paragraph [0060]). Murase teaches electroluminescent devices that comprise the phosphine oxide have excellent thermal stability, high luminous efficiency, low drive voltage, and excellent color purity (paragraph [0078]).

17. Murase does not specifically teach an electroluminescent device comprising the applicant's claimed invention.

18. Given the teaching of Murase, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make at electroluminescent device comprising in order an anode, a hole transporting layer composed of NPD, an electron transporting layer composed of a phosphine oxide of Murase's formula (1), where Ar^1, R^1, and R^2 are an aryl group such as benzene, biphenyl, naphthyl, and phenanthrene, a cathode and where the electron transporting layer is formed using spin coating. The motivation would have been to make an electroluminescent device with excellent thermal stability, high luminous efficiency, low drive voltage, and excellent color purity.

19. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murase et al. (JP2004-095221) (hereafter "Murase"), where a machine translation is used as an English equivalent, in view of Spaochak et al. (WO 2005/073340) (hereafter "Spaochak").

20. Regarding claims 1-4, Murase teaches an electroluminescent device comprising an anode and a cathode and a hole transporting layer and an electron transporting layer found between the two electrodes (paragraphs [0005]). Murase teaches the hole transporting layer can be composed of NPD, which the applicant teaches as a hole transporting material that is not soluble in alcohols (paragraph [0015]). Murase teaches the electron transporting material can be a non-ionic phosphine compound and the phosphine compound can have the following formula, formula (1), where Ar^1, R^1, and R^3 can be aryl groups, such as benzene, biphenyl, naphthyl, and phenanthrene (paragraphs [0028]-[0038] and [0043]), which meets applicant's formula (1). Murase teaches the compounds can contain two phosphine oxides (formula (2)). Murase teaches the electron transporting layer can be made by using spin coating a wet method (paragraph [0060]). Murase teaches electroluminescent devices that comprise the phosphine oxide have excellent thermal stability, high luminous efficiency, low drive voltage, and excellent color purity (paragraph [0078]).

21. Murase does not specifically teach an electroluminescent device comprising the applicant's claimed invention.

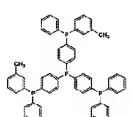
22. Spaochak teaches electroluminescent devices that are comprised of compounds containing diphosphines and these diphosphine are electron transporting (page 13 lines

6-13). Spaochak teaches the phosphine compounds to have the following structures, PO1 and PO8 (Figure 3). PO1 and PO8 are the same as the applicant's compounds (6-1) and (6-3); therefore, PO1 and PO8 are inherently soluble in alcohols.

23. Given the teaching of Murase and Spaochak, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make at electroluminescent device comprising in order an anode, a hole transporting layer composed of NPD, an electron transporting layer composed of a phosphine oxide, a cathode and where the electron transporting layer is formed using spin coating. It would have been obvious to substitute the phosphine compounds of Murase for the phosphine compounds of Spaochak (PO1 and PO8). The substitution would have been one known electron transporting phosphine oxide for another, with the expected results of using phosphine oxides (PO1 and PO8) in the electron transporting layer of an electroluminescent device. The motivation to make the device with the phosphine compounds would have been to make an electroluminescent device with excellent thermal stability, high luminous efficiency, low drive voltage, and excellent color purity.

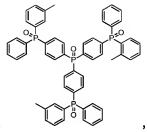
24. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuura et al. (JP 2003-317965) (hereafter "Matsuura"), where a machine translation is used as an English equivalent.

25. Regarding claims 1-6, Matsuura teaches an electroluminescent device comprising an anode and a cathode and a hole transporting layer and an electron transporting layer found between the two electrodes (paragraphs [0079]). Matsuura

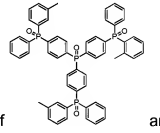
teaches the hole transporting layer can be composed of NPD, which the applicant teaches as a hole transporting material that is not soluble in alcohols (paragraphs [0091] and [0092]). Matsuura teaches the electron transporting material can be a non-ionic phosphine compound and the phosphine compound can have the following formula, formula (2), where X can be oxygen and R_{21}-R_{23} can be aryl groups, such as phenyl (paragraphs [0017]-[0042] and [0044]). Matsuura teaches a similar formula (5), which is similar to formula (2), except that the X group is missing, but in both formulae R_{21}-R_{23} and R_{51}-R_{53} can be the same thing (paragraph [0068]). Matsuura teaches that the following compound represents formula (5),  (paragraph [0073]). Matsuura teaches the electron transporting layer can be made using spin coating (paragraph [0099]). Matsuura teaches that electroluminescent devices that use these phosphorous containing compounds have improved luminescence luminosity and lifetime (paragraph [0148]).

26. Mastuura does not specifically teach a compound that reads on applicant's formulas (2) and (3).

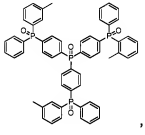
27. Given the teaches of Mastuura, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a phosphine oxide

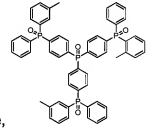
compound with the following structure,  , and make an

electroluminescent device comprising in order an anode, a hole transporting layer

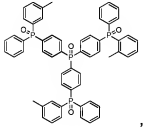
composed of NPD, an electron transporting layer composed of  and

deposited using a spin coating method, and a cathode. The made compound,

 , has a structure that is similar to applicant formula (J), which the

applicant's teaches is inherently soluble in alcohols; therefore, 

would be insoluble in alcohols. Matsuura teaches a similar compound to

 , but the compound does not contain phosphine oxides, but

Matsuura teaches that formula (2) and formula (5) only differ in that one contains an oxide; therefore, it would have been obvious to one of ordinary skill in the art the make the phosphines phosphine oxides in the compound taught by Matsuura. The motivation to make the electroluminescent device with the phosphine oxide would have been to improve luminescence luminosity and lifetime of the device.

Conclusion

28. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew K. Bohaty whose telephone number is (571)270-1148. The examiner can normally be reached on Monday through Thursday 7:30 am to 5:00 pm EST and every other Friday from 7:30 am to 4 pm EST.

29. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, D. Lawrence Tarazano can be reached on (571)272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

30. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. K. B./
Andrew K. Bohaty
Patent Examiner, Art Unit 1786

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art Unit 1786